DESC IRP Stakeholder Advisory Group Planning Meeting

June 28, 2021

Meeting Participants

- DESC
  - Betty Best
  - Eric Bell
  - Andrew Walker
  - James Neely
  - Therese Griffin

- CRA
  - Patrick Augustine
  - Gary Vicinus
  - Robert Kaineg
  - Yuki Zbytovsky

- Advisory Group
  - Anna Sommer
  - Anthony Sandonato
  - Bill Cummings
  - Brian Manley
  - Chelsea Hotaling
  - Eddy Moore
  - Hamilton Davis
  - John Sterling
  - Kenneth Sercy
  - Maggie Shober
  - Michael Adedoja
  - Natasha Pauling
  - O'Neil Morgan
  - Ryder Thompson
  - Stacey Washington
  - Indu Manogaran
  - Ben Garris

Charles River Associates

June 28, 2021

Agenda

- Stakeholder Process Update
  - Comments and feedback received from Session II Homework and Session III agenda
  - Updates made to the Transmission Impact Analysis responsive to Stakeholder feedback
  - Plan to proceed with PLEXOS and changes made to intervenor license responsive to Stakeholder feedback
- Retirement Analysis Update
  - Update on timeline and expected process for the retirement analysis
  - Review details of Transmission Impact Analysis and how scenarios bookend options for DESC
  - Discuss proposed guidelines for the Retirement Study with Stakeholders

<15 min break>

- 2021 IRP Update Process Update
  - Review of final order on 2020 Modified IRP and timeline to the 2021 IRP Update
  - Requirements for 2021 IRP Update from the final order and preceding orders
- 2021 IRP Update Inputs & Assumptions
  - New Portfolio Concepts (the low carbon portfolio, near term solar and storage, the "CT Plan")
  - Solar ELCC
  - Portfolio Selection Criteria
  - Risk Metrics
  - Reliability Factors

<45 min break>

- 2021 IRP Update Inputs & Assumptions (continued)
  - LCSE
  - Marginal line losses
  - Load Forecasts, EE integration
- Homework for Session IV and Next Step

June 28, 2021

Meeting Minutes

Stakeholder Process Update

Welcome

Mr. Robert Kaineg from CRA opened Session III of the Stakeholder Advisory Group by welcoming the Advisory Group members and addressing the Session's meeting agenda. He then outlined the introductory topics for the meeting. These included the review of Stakeholder feedback received since Session II, updates to the Transmission Impact Analysis (TIA) which were responsive to Stakeholder feedback, and DESC's plan to proceed with PLEXOS and the changes made to the intervenor license in response to Stakeholder comments.

Mr. Kaineg reiterated that in Session III, like previous sessions, the chat is open to the Advisory Group Members for Q&A, and questioners would be unmuted to provided follow up during the working session, and that all written questions asked during the Session would be answered on the DESC Stakeholder website if live discussion was cut short.

Following his welcome, Mr. Kaineg expanded on a timeline of the Stakeholder process and described points of progress that were made since the Session II meeting. He noted that the Joint Comments by IRP Intervenors filed on April 20th, 2021 had touched on the Stakeholder process and key topics being address by DESC with its Stakeholders, including the Retirement Analysis and selection of the capacity expansion model. He then discuss process milestones reach since Session II, including the posting of minutes and Q&A from Session II, discussions with Energy Exemplar to revise the intervenor agreement (which was made available for review), Stakeholder homework from Session II, the June 2nd Commission directive, the final Commission Order on the 2020 Modified IRP (Order No. 2021-429), and the posting of the Modified TIA to the Stakeholder website.

He explained that the material prepared for Session III would focus on coal retirement analysis and DESC's upcoming 2021 IRP Update filing ordered 60-days from June 18th in Commission Order No. 2021-429.

Comments and feedback received from Session II Homework and Session III agenda

Mr. Kaineg clarified the organization of the upcoming slide material. He explained that material included both the Joint Comments from the April 20th, 2021 filing; and homework feedback received from Session II of the Stakeholder Advisory Group Process.

With this explanation, Mr. Kaineg showcased and summarized select Stakeholder comments from the Joint Comments filed on from April 20th. He reiterated that the material on the slide is not exhaustive but focused on comments specific to the current Stakeholder process, retirement analysis, and the capacity expansion model selection. He summarized the feedback from intervenors on each topic, then outlined DESC's responses and actions taken to address those comments, all of which are listed on slide 7 of the presentation.

Following review of the April 20 intervenor comments, Mr. Kaineg provided a recap of the Stakeholder feedback that was received as part of the homework requested in Session II. Mr. Kaineg reviewed the questions that had been posed to Stakeholders in Session II which are repeated below:

1. **Review advisory group minutes and provide comments**

The 1st topic of interest was feedback regarding the meeting minutes. Mr. Kaineg explained that no comments or feedback were returned by the Stakeholders pertaining to the minutes, and therefore no changes were made to the files posted on the DESC website.

2. **Topical Feedback: What other issues should be addressed in Session III?**

Topic 2 included feedback on the agenda for Session III and future Advisory Group Meetings. The feedback was divided into three groups: first were topics that Stakeholders requested for inclusion in Session III; second were topics requested for any future session, and the third were topics that were requested, but the request was deemed outside of the scope of the Advisory Group Sessions.

The topics requested by Stakeholders specifically for Session III were the timeline for coal plant retirements and energy efficiency modeling in the 2021 IRP Update. In response to this feedback, DESC included both topics in the Session III agenda.

Topics suggested for any future sessions included: solar flexibility analysis and DESC's modeling, system reliability metrics and the approach to developing rankings, scenario development for future IRP's and possibility that Stakeholders can propose new scenarios, and the representation of advanced technologies in the new resource options. In response to this feedback, the solar ELCC and reliability factors were included in the Session III agenda. Mr. Kaineg assured the Advisory group that the remaining topics would be addressed in future Advisory Group Sessions.

Finally, there was a request by Stakeholders to address the potential benefits of modeling a coal retirement securitization scenario to inform public policy considerations. Mr. Kaineg noted that this topic was deemed out of scope for the IRP Advisory Group because allowing securitization of coal retirement costs would require a legislative change. The purpose of this advisory group is to inform the approach and inputs to DESC's IRP, including the selection of the capacity expansion model. Therefore, this category was deemed outside of the scope of the Stakeholder process.

3. **Model Evaluation Feedback: Did we achieve consensus that PLEXOS performs all required functions?**

Next, Mr. Kaineg moved to the 3rd topic of interest: model evaluation feedback and changes to the intervenor license. He summarized the feedback received on capacity model selection, noting that Stakeholders had not objected to the PLEXOS on technical grounds, but had raised concerns about the terms of the license agreement that had been provided by Energy Exemplar to Stakeholders. He added that at least one Stakeholder had responded affirmatively that PLEXOS performs all the required functions.

Mr. Kaineg then reviewed six key points of concern raised by the Stakeholders regarding the terms of the PLEXOS intervenor license. These points indicated concerns about the cost of the model, restrictions on intervenors to work with their consultants, access to training and support, in addition to other factors. A numbered list of the six topic areas are listed on slide 12 of the meeting presentation.

Following an explanation of these six areas of feedback regarding the model intervenor license, Mr. Kaineg moved on the provide responses to the general feedback received as well as the six specific comments enumerated on the prior slide. He expressed that DESC and CRA have made a full effort to address every concern raised by Stakeholders and review the DESC responses to each of the six concerns raised.

4. 2021 IRP Update Inputs: Is the DESC approach consistent with the order, are there any gaps?

Next, Mr. Kaineg addressed topic number 4, which sought feedback on whether DESC addressed all the requirements per the Commission's Orders for the 2021 IRP Update. He noted that Stakeholders had not recommended changes to DESC's 2021 IRP Update specifically as part of the feedback from Session II, but that Stakeholders had proposed changes in their April Joint Comments. He then reviewed the comments provided by Stakeholders relating to the IRP and noted that DESC planned to cover each point in their upcoming discussion of 2021 IRP Update inputs. DESC's recap of the Joint Comments are listed on slide 13 of the presentation materials.

5. Risk Metrics Feedback: What metrics, in addition to Mini-Max, should DESC evaluate with the expected outputs?

The 5th topic area involved the risk metric feedback and proposed metrics beyond Mini-Max analysis. Mr. Kaineg noted that Stakeholders provided initial comments on the application of Mini-Max and the importance of evaluating a range of NPV results. Stakeholders had also provided the feedback that DESC should consider weather risk when evaluating the preferred plan.[1] Other than the recommendation to consider weather, no new risk metrics were proposed. Mr. Kaineg also explained that comments that related to the need to discuss proper calculation and application of Mini-Max and cost range analysis would be addressed in the Session III agenda. It is important to note that both IRP orders specify the inclusion of average rankings.

6. Retirement Analysis: What other considerations should DESC study in addition to transmission impacts?

Mr. Kaineg then moved to the 6th topic which was feedback requested from Stakeholder regarding DESC analysis of early coal retirements and any key considerations that DESC should evaluate. On this topic, Stakeholders responded through both the homework from Session II and the website Q&A. Stakeholder feedback from the Session II homework noted the need to evaluate overall system reliability impacts, while the questions on the website focused on the timing of the analysis and how it aligns with the ELG plan. Since the questions and responses on the Q&A page were lengthier than could fit on the presentation materials, the Q&A was paraphrased in the slide material. Mr. Kaineg reminded

[1] This was originally not captured on the slide and was updated following the Session III discussion.

the Advisory Group that the full questions and responses were available on the DESC Stakeholder Advisory Group website. Finally, he noted that the Retirement Analysis was an upcoming section of the Session III materials and that DESC would be providing more detail around the process and timeline as requested by Stakeholders.

Updates made to the Transmission Impact Analysis responsive to Stakeholder feedback

Within the topic of the retirement analysis, Mr. Kaineg also addressed updates to the Transmission Impact Analysis (TIA). He expressed that DESC had shared the details of the TIA during Session II, which requested a study of the transmission impacts of retiring the Wateree plant in 2025 or 2028 and replace it with various resource options. While not requested specifically as a homework item in Session II, DESC responded to concerns raised by Advisory Group members during Session II about the timing of the Williams retirement study and scenarios selected for evaluation. Mr. Kaineg noted that DESC had updated the TIA in May to reflect these concerns by adding early retirements of Williams station to the request and selecting plans that attempt to bookend different replacement options. He noted that the modified TIA including the details of early Williams and Wateree retirements was available on the Stakeholder Materials section of the Stakeholder website.

Stakeholders raised other questions about the TIA in Session II feedback, including whether the TIA scenarios were prescriptive for the future IRP, and how the TIA outputs fed into the broader coal retirement analysis. Mr. Kaineg reassured the Advisory Group that the TIA is one aspect of retirement analysis and is not intended to be prescriptive. He expressed that there would need to be a more detailed interconnection study later in the process, and that the resource options that DESC would consider in future IRPs would not be limited to the TIA scenarios.

7. Retirement Analysis: What other considerations should DESC study in addition to transmission impacts?

Following the discussion of their retirement analysis, Mr. Kaineg moved to the 7th topic, which was the Advisory Group feedback on solar winter capacity values. He explained that Stakeholders had indicated interest in a future session related to the measurement of solar capacity value and system reliability more broadly, but had not suggested any specific inputs or approaches for DESC to consider. However, Stakeholders had indicated an interest in the topic and their intention to provide further comments at a future time. Mr. Kaineg reassured the Advisory Group DESC would continue to be receptive to that feedback and intends to include it as a future discussion item. Mr. Kaineg explained that the previous question on winter solar capacity from Session II would be included once again to allow additional time to develop this feedback.

Additional IRP Advisory Group Session II Feedback and Q&A

Finally, Mr. Kaineg outlined additional Advisory Group feedback that was not encompassed under the seven topics specifically covered in the Session II homework. The feedback was primarily related to energy efficiency and DSM and received through the Stakeholder website Q&A function. Mr. Kaineg reminded the advisory group that the full Q&A responses were available on the website, then proceeded to summarize the questions and responses. Mr. Kaineg also noted that DESC IRP Advisory

Group would focus on EE and DSM assumptions used in the IRP and integration with the load forecast, but that the technical assumptions of the underlying DSM analysis were better addressed in the existing DSM Advisory Group. He explained that questions to record to the IRP Advisory Group should relate to how DSM and measures will be reflected in the IRP or what assumptions will be used, and that the separate DSM Advisory Group was a more appropriate forum for discussing the details of DESC's DSM analysis and underlying assumptions.

Mr. Kaineg then opened the floor to questions.
All questions and answers from this session are documented in the Appendix Table 1: Question 1.

Retirement Analysis Update

Update on timeline and expected process for the retirement analysis

Mr. Kaineg re-opened the session by introducing the topics for the second session and informed the Stakeholders that CRA would be supporting DESC as an advisor to assist with the development of the early coal retirement analysis. He noted that DESC would be performing all steps of the analysis.

Mr. Kaineg then gave an overview of the timeline and the expected process for the early coal retirement analysis. He walked through a process flow diagram (depicted on slide 22 of the presentation slides) which outlined how DESC envisions the key thematic steps of the retirement analysis process. He noted that the retirement analysis is intended to support future IRPs and being implemented with a goal towards producing the inputs needed to support future IRP analysis in PLEXOS. Mr. Kaineg explained that having a robust retirement analysis process ensures strong and realistic results for retirement dates, which allows for further studies to be conducted using the findings from the retirement analysis.

Mr. Kaineg expanded that since retirement analysis cannot be modeled in a vacuum, DESC will also be developing a limited set of replacement options to include in the retirement analysis. This additional analysis is not intended to be an evaluation of replacements, which should be done in the IRP. The focus of the early retirement study is to evaluate the when the retirement should occur, not on exactly what should replace it.

Following his walk-through of the process chart, Mr. Kaineg again covered DESC and CRA's roles in the process, reiterating that DESC would be performing all elements of study including developing the inputs, performing the analysis, and interpreting the results.

Next, the development of study assumptions was addressed in more detail. The initial list of study assumptions was listed on slide 23 of the presentation. Mr. Kaineg expressed that DESC would like to hear Stakeholders' thoughts on the prioritization of the assumptions, and suggestions for any further assumptions or elements that should be considered beyond the list presented.

Mr. Kaineg then provided an example of the potential retirement scenario concepts that DESC might employ to evaluate the early retirement of the Williams and Wateree plants, using the framework he previously explained and the dates taken from the modified TIA as examples. He noted that the

retirement concepts and dates presented were illustrative and would be informed by the findings of the retirement study. He reiterated that the examples on the slides were not prescriptive and would not limit the options that could be part of the final build plan. These will be expanded in the all resource RFP which will inform the 2023 IRP. Then, he provided examples of the logic behind the construction of possible retirement scenario concepts. His examples ranged from a "No Early Retirement" scenario, to an "Earliest Possible Retirement" scenario, among others. He again noted that the examples provided in the slide material were illustrative and did not reflect DESC's conclusions from the retirement study or 2023 IRP.

Next, Mr. Kaineg discussed the expected timeline for the retirement analysis and the alignment with respective outputs needed for the 2023 IRP. He explained that Q3 2022 deadline was aligned to the need to finalize the relevant inputs to the 2023 in time to support the IRP analysis. He reminded the Advisory Group that the timeline of the study is subject to procedural schedules defined in the Coal Retirement Docket.

Mr. Kaineg then opened the floor to questions.
All questions and answers from this session are documented in the Appendix Table 1: Questions 2 through 8.

Review details of Transmission Impact Analysis and how scenarios bookend options for DESC

Following the Q&A session, the presentation was handed to Mr. Eric Bell of DESC. Mr. Bell reiterated to the Stakeholders that the Transmission Impact Analysis is not meant to be a complete study, and is instead just one element of the broader retirement analysis. He explained that the study would inform the estimated cost and transmission impacts shutting of the coal plants under different replacement conditions, and that this information would be helpful in estimating for the expected cost of different retirement and replacement options in the future IRP analysis, noting that a full interconnection study would be needed to evaluate the specific impacts of any specific resource selected by DESC at a later step in the process.

Mr. Bell also highlighted the changes to the Modified TIA in response to Stakeholder feedback, emphasizing the addition of the retirement of Williams in addition to Wateree. Following this explanation, he reviewed the details of the five Modified TIA Cases, which laid out different dates and replacement options associated with the early retirement and replacement of the coal plants, noting that one plan relied almost entirely on power purchases to meet the gap. He also reviewed that, for all cases, the Transmission Group had the option to meet addition of 117 MW winter rating dual fuel aeroderivative CTs at the Williams station to maintain system reliability.

Discuss proposed guidelines for the Retirement Study with Stakeholders

Mr. Bell then posed questions on the retirement study guidelines to the Advisory Group. To begin the discussion, he asked the Stakeholders for feedback on what factors are important for DESC to consider when evaluating coal retirements, he also inquired about which elements of the study Stakeholders found most important and/or impactful that should be prioritized by DESC.

Mr. Bell then opened the floor to questions and responses.
All questions and answers from this session are documented in the Appendix Table 1: Questions 9 through 17.

< 15 min break >

2021 IRP Update Process Update

Review of final order on 2020 Modified IRP and timeline to the 2021 IRP Update

Mr. Bell continued the presentation with an update on the 2021 IRP Update process. He walked through the DESC's understanding of the Commission Requirements laid out in Order No. 2021-429, for which a full list is represented in slide 32 of the presentation.

Requirements for 2021 IRP Update from the final order and preceding orders

With this Mr. Bell passed the presentation to Mr. Kaineg who shared two slides illustrating how the requirements from Order 2021-429 had altered the requirements shared with Stakeholders in Session II, which contained a summary of the requirements of Order No. 2020-832 by topical area and IRP vintage. He noted that areas of change had been highlighted in red, as seen on slides 33 & 34 of the Session III presentation, that DESC was actively tracking and incorporating these requirements into its IRP planning process.

Mr. Kaineg then opened the floor to questions and responses.
All questions and answers from this session are documented in the Appendix Table 1: Questions 18 and 19.

2021 IRP Update Inputs & Assumptions

Following the Q&A Mr. Bell continued the presentation on the 2021 IRP Update inputs and assumptions. He first presented a list of inputs and assumptions that will be discussed during this meeting. He expressed that DESC is open to feedback from the Advisory Group on the assumptions and inputs listed.

New Portfolio Concepts (the low carbon portfolio, near term solar and storage, the "CT Plan")

In the following slide Mr. Bell outlined the inputs and assumptions for each of the low carbon portfolio, near term solar and storage, and the "CT Plan". He indicated that the modeling of the new low carbon portfolio may need to be deferred to the 2022 IRP Update due to the constrained nature of the 2021 IRP Update timeline driven by the 60-day deadline set in Order No. 2021-429. Mr. Bell then continued to provide greater detail about the modeling inputs for solar PPAs required by Order No. 2020-832 and DESCs plans to model near term solar and storage int the 2021 IRP Update. Finally, he confirmed that the 2021 IRP Update would address and model the CT Plan in each resource plan.

Solar ELCC

Following his explanation, Mr. Bell handed the presentation to Mr. James Neely of DESC to cover the solar ELCC assumptions. Mr. Neely expressed that although DESC intends to use a similar approach to measuring solar ELCC, that there is opportunity to improve the approach. He explained that the homework feedback will be valuable in gathering input from Stakeholders on a more appropriate way to measure the value of solar to the system. Mr. Neely especially highlighted that the annualized ELCC calculation can be imprecise as an indicator of the seasonal requirements that will be modeled by DESC in the 2021 IRP Update. He noted that 11.8% value was the result of an annual calculation and suggested that it overstates the capacity benefit of solar in the winter and understates its value in the summer. Instead, he suggested using a bimodal calculation to include separate summer and winter values and asked the Stakeholders for additional feedback.

Portfolio Selection Criteria

Mr. Neely then moved to explain the portfolio selection criteria that would be used in the 2021 IRP Update to determine the portfolio that is reasonable and prudent in compliance with Act. 62 requirements.

Risk Metrics

Mr. Neely also outlined the risk metrics that are planned for use in the 2021 IRP Update. He referred to a list of metrics on the presentation and emphasized DESC's desire for Stakeholder feedback on the risk metrics.

Mr. Neely then opened the floor to questions and responses.
All questions and answers from this session are documented in the Appendix Table 1: Questions 20 through 33.

Reliability Factors

After the discussion, Mr. Bell continued the presentation and outlined the reliability factors that DESC planned to assess in the 2021 IRP Update. He highlighted that different types of generating units contributed different elements of reliability and noted the 30-year timeline of the resource plan and the importance of how resources contribute to the attributes over the entire life of the plan. Mr. Bell also added that the DESC team may consider removing inertia as a reliability factor in future IRP analyses in response to the feedback provided by the Stakeholders. Mr. Bell also recognized the changes to reliability factors that were offered by the intervenors, and notes that DESC will update their IRP processes accordingly.

LCSE

Ms. Therese Griffin of DESC continued the presentation to address DSM inputs.

First, Ms. Griffin addressed the ordering provision number 7 where DESC is directed to employ a reasonable LCSE, compatible with industry standards, in conducting its upcoming market potential study and in developing future IRPs. She clarified the official definition of LCSE (the NPV of the full program costs divided by the NPV of the cumulative lifetime savings from all the measures of the program) and discussed how this factor would be addressed in the 2021 IRP Update. Ms. Griffin explained that the levelized cost considers savings over the lifetime of the program while the initial installed costs only consider the savings in the first year.

Marginal line losses

Ms. Griffin then addressed ordering provision 9 where DESC is directed to use marginal line losses in the calculation of avoided costs in the translation of energy savings from the market potential study to energy savings and future IRP modeling. She clarified DESC’s approach and explained that marginal line losses recognize the additional line losses that occur outside of normal operating times and is coincident with the peak, and therefore was used to evaluate capacity savings of EE measures. The average line loss factor was used for energy savings, because these savings occur across the year when line losses are lower than the marginal line loss factor outside of peak conditions. She explained that the average line loss measure inherently included the amount of savings that occurs during the peak and non-peak times over the course of the year.

She then explained how DESC's benefit calculation results in the same number despite minor differences in methodology, showing how DESC's method allows one to ascertain both the wholesale and meter level savings. She explained that calculations will be provided in the 2021 IRP Update and that the low, medium, high scenarios will be updated accordingly.

Load Forecasts, EE integration

Following Ms. Griffin's presentation Ms. Betty Best of DESC continued. Ms. Best described the load forecast assumptions that would be used in the 2021 IRP Update and confirmed that DSM marginal line

losses would be calculated as required in Order No. 2021-429. She also noted DESC's intent to continue to discuss the IRP load forecast values with Stakeholders in future meetings.

Ms. Best then clarified that the load forecast used in the 2021 IRP Update would incorporate energy efficiency. She once again highlighted DESC's intention will continue to include the energy efficiency topics in future Stakeholder meetings to inform future IRP's.

Ms. Best then opened the floor to questions and responses.
All questions and answers from this session are documented in the Appendix Table 1: Questions 33 through 37.

Using the chat function, Mr. Andrew Walker of DESC posed a question to the Advisory Group for feedback for other reference documents about grid-forming inverters that DESC's should be aware of. He mentioned that personally, he is aware of the NREL Technology Roadmap linked here: https://www.nrel.gov/docs/fy21osti/73476.pdf

Stakeholders provided a link to the following document in response:

https://www.esig.energy/download/going-the-distance-moving-ac-power-from-large-inverter-based-generation-pockets-to-load-centers-nick-miller-matthew-richwine/

DESC and Stakeholders agreed to take the 45 minute lunch break and then retire to discuss Mr. Sercy's questions regarding the risk metrics for the 2021 IRP Update and future IRPs.

< 45 min break >

Following the break, Mr. Kaineg opened the floor to continue the previous discussion. Turning to slide 33, he noted requirement from Order No. 2021-429 relating to the use of risk metrics in the 2021 IRP Update. The group then discussed potential benefits of considering alternate metrics, and it was noted that Stakeholders had indicated weather risk as another possible consideration in the Session II feedback. Stakeholders suggested additional discussion on the topic at future meetings.

All questions and answers from this session are documented in the Appendix Table 1: Questions 38 through 40.

Homework for Session IV and Next Steps

Following the discussion Mr. Kaineg continued the presentation to set expectations for next steps and the timing IRP Advisory Group Session IV, expected in early August 2021. He reviewed a timeline of expectations and noted that Session IV will occur in approximately 5 weeks and will focus on the retirement study, especially given the importance of the study and Stakeholders' expressed interest in the topic. Following this Mr. Kaineg explained that Session V would focus on inputs to the 2022 IRP Update and was expected to convene in September following the submission of the 2021 IRP Update in mid-August.

Next Mr. Kaineg outlined a list of topics, covered on slide 53 of the presentation, to gain direct feedback on from the advisory group as homework. He reiterated that the DESC and CRA teams will be sure to include any additional topics of interest into the agenda. He noted that the solar ELCC question from Session II has been repeated intentionally because Stakeholders had indicated they have additional comments. Mr. Kaineg closed by reminding Stakeholders that DESC continues to seek feedback on any additional topics that should be addressed, he reiterated that Stakeholders should feel free to include any comments outside those specifically requested as part of the Session III homework.

He then opened the rest of the scheduled meeting time for questions and discussion.

Mr. Kaineg then opened the floor to questions and responses.
All questions and answers from this session are documented in the Appendix Table 1: Questions 41 through 46.

In closing, Mr. Kaineg reminded the Advisory Group that the minutes and materials for today's meeting would be posted to the DESC website at https://www.DESC-IRP-Stakeholder-Group.com. Advisory Group Members can also email DESC-IRP-Group@crai.com with any questions or comments, and if they have content to share with DESC or the Stakeholder group.

Appendix

Table 1: Stakeholder Session III Q&A and Comments

	Question / Comment	From	Topic	Answer
1	When is the 2021 IRP Update due?	Hamilton Davis	2021 IRP Update Inputs & Assumptions	The 2021 IRP Update is due on August 17th, 2021 based on the 60-day deadline set by Order No. 2021-429.
2	How would you propose to use the IRP to examine resource alternatives other than those used in the TIA? How would you know if other alternatives provided the needed level of reliability?	Anna Sommer	Retirement Analysis - TIA	It is not DESC's intent to limit resource options in future IRP analyses to the cases requested from the Transmission Group in the TIA. PLEXOS will have many resource options available for resource optimization. Although the replacements in the TIA will not correspond 1-for-1 with the options considered in future IRPs, the TIA examines a range of replacement options will allow DESC to understand the transmission impacts of different replacement technologies at different locations. Strategies that are modeled in the TIA are not the only ones that will be considered for the IRP, but instead attempt to bookend the different strategies DESC might evaluate including replacements with ESS and solar and relying primarily on market purchases to meet the gap.
3	I have concerns when reading the modified TIA letter from May 13th. It is unclear what liberties the	Anna Sommer	Retirement Analysis - TIA	Thank you for this suggestion. DESC agrees that given the transmission constraints created by coal

	transmission planning group can take with the study. Although they will be looking at more combinations of generation replacements, there are other aspects that affect reliability (e.g. re-dispatching of other units). It is unclear whether the transmission planning group can make changes to reflect these differences. So, I am worried that there are limits to how the Transmission Group can study that problem that may influence the resulting analysis.			plant retirement, the Transmission Group should have the latitude to try to minimize the cost of the constraint using many different measures. Although it is not made explicit in the transmission letter, it is understood by the Transmission Group that they should investigate operational measures in addition to transmission equipment that can mitigate transmission issues. We can follow up in the letter clarifying that re-dispatch and other operational aspects are explicitly included.
4	It would be great if aspects such as EV and storage could be modeled as alternative measures to alleviate transmission issues. It would also be great if the Transmission Group could measure the impact from grid-forming inverters.	Anna Sommer	Retirement Analysis - TIA	The Transmission Group has some limitations on what they can model, but we understand that they include many kinds of transmission equipment in addition to operational changes. We will need to follow up with the Transmission Group for more detail as to what measures are considered specifically in their analysis and whether that includes grid-forming inverters.
5	Please let us know if there is a data-related issue with modeling the additional aspects (per comment #4).	Anna Sommer	Retirement Analysis - TIA	Thank you, we will follow up if needed.
6	Is it possible that you'd perform another TIA for the '23 IRP that might include another set of replacement resources that may come out of the PLEXOS analysis?	Eddy Moore	Retirement Analysis - TIA	The 2023 IRP will be informed by bids from the All Source procurement process. Any preferred plan selected in that IRP would require a more detailed interconnection study to assess the transmission impacts of the specific projects in question.
7	Just for completeness, and this may be understood; Anna mentioned re-dispatch as a transmission	Eddy Moore	Retirement Analysis - TIA	Thank you for this clarification.

	planning group function that could minimize cost, not just transmission equipment (referencing comment #3).			
8	It seems like most of the assumptions listed here are basic inputs to the IRP and shouldn't be a big lift beyond what DESC is already doing to develop IRPs.	Kenneth Sercy	Retirement Analysis	Thank you for this comment.
9	Given the specificity of these cases, what if the capacity optimization model selects something other than the 5 cases outlined in the retirement analysis?	Kenneth Sercy	Retirement Analysis - TIA	If the resource optimization selects something other than the five TIA cases, it has been informed by the transmission impact at these sites. The capacity optimization model suggests whether the early retirement is lowest cost and comparison of the strategy with the TIA cases provides an indication of the expected transmission impacts to inform the IRP. These cases are specific because the transmission planners need to be given instructions on what to study in a limited time period which is impossible for a larger set of scenarios. The expectation is that the optimization process will go into the procurement process, and the true interconnection costs will also be delineated and inform the expected cost of maintain reliability. TIA is not intended to be prescriptive to the IRP, it is indicative of many replacement strategies that might be selected so that their impacts can be compared to inform the IRP analysis.

10	How is the TIA is interacting with capacity optimization modeling? I understand the responses (in question #9) and understand that the results of the TIA are indicative. But, are the TIA results somehow going to be input into the capacity optimization model so that for every resource option that is loaded into the capacity optimization model, DESC knows what the transmission updates and costs will need to be to use the resource option as a replacement to the coal plants?	Kenneth Sercy	Retirement Analysis	DESC is holistically asking these questions as part of the overall retirement study. For the TIA, outside of informing resource optimization and procurement, it is an open technical question, especially for the Williams plant. DESC must still determine the order of magnitude of costs of mitigating transmission issues under different replacement options to accommodate many concerns pertaining to the reliability provided by the Williams plant due to its location near Charleston, SC. We recognize the need for more discussion around this topic.
11	To the extent that the TIA is assuming generation replacement at a specific location, will that be limiting during the IRP modeling process when evaluating where replacement capacity can be sited?	Hamilton Davis	Retirement Analysis	The TIA is not intended to be limiting. DESC has prepared a robust list of candidate resources for evaluation. We had to provide discreet cases for modeling to the Transmission Group in our request. DESC will evaluate different candidate plans as part of the optimization process and in further studies.
12	Why is capacity expansion modeling not done at the front of the process?	Hamilton Davis	Retirement Analysis	DESC has not yet developed a preferred plan using the capacity expansion model and the timeline does not allow DESC to request this information following the 2021 IRP update. PLEXOS will be able to select from a fuller range of possible of replacement resources and the results of the TIA are just one piece of this analysis. They will inform the best combination of resource

				options by enabling DESC to estimate the likely differences between strategies from the perspective of their transmission impacts. To reiterate, the results of the TIA are not final outputs for future IRPs or the retirement analysis that DESC is performing in parallel. Since the Transmission Group has not looked at early retirement scenarios before, the TIA will inform DESC's analysis of early retirements at the Williams and Wateree Plants, and illuminate the congestion impacts of these early retirements.
13	DESC should ensure that the results of the TIA do not limit the capacity modeling and what will be considered in the next IRPs.	Hamilton Davis	Retirement Analysis	Thank you for this comment.
14	It seems that the TIA scenarios focus on putting most of the generation at Canadys, Jasper, or Wateree, with only aero-peaking at Williams. Is this due to known gas or transmission constraints at Williams?	Eddy Moore	Retirement Analysis	This is mainly due to gas constraints at Williams. The Williams site could still be considered for gas-fired resources but may have higher costs on higher quantities of FT contracts than other sites. Renewables and other resources should be considered at Williams and could have lower electric I.A. costs up to 600MW.
15	For the ESS options, I assume you are looking at a 4-hour duration as the standard assumption?	John Sterling	Retirement Analysis	4-hour batteries are a resource currently being evaluated. DESC will consider extending the duration of storage analyzed in the future to reflect seasonal reliability needs as more of the resource is added to the system.

16	What about demand response and clean energy PPAs as replacement options?	Kenneth Sercy	Retirement Analysis - TIA	DESC is looking at off-system purchases scenarios in the Modified TIA and this power could potentially be served by PPAs. PPAs are named in the TIA. Because DER impacts are very location specific, DESC will first have to understand more details about the proposed project to understand how it interplays with the transmission process.
17	Do you anticipate any reason that the TIA modeling files couldn't be turned over to Stakeholders under NDA in the same way the IRP modeling files will be?	Anna Sommer	Retirement Analysis - TIA	Our team will have to follow up with the Transmission Group. We do not expect the Transmission Group to turn over modeling files to the public. The public materials will likely be the TIA or the redacted version of the TIA. There is an expectation that the deliverable will be similar to an effective system study or an interconnection study depending on what we receive from the Transmission Group.
18	For the near term solar and storage additions, can DESC provide more detail as to what specifically will be modelled and included?	Hamilton Davis	2021 IRP Update Inputs & Assumptions	See response to Question 21 below.
19	Is final language available from PSC or still just have the directive?	Kenneth Sercy	2021 IRP Update Inputs & Assumptions	The final language is available from the PSC.
20	What tool would DESC use to calculate a summer and winter capacity value for solar?	Anna Sommer	2021 IRP Update Inputs & Assumptions	Traditionally, SAS programming is used.

21	I propose modeling a candidate plan that looks like RP8 but that adds the near-term solar/storage from RP7a/b.	Kenneth Sercy	2021 IRP Update Inputs & Assumptions	Thank you for this suggestion. We are also pleased to inform Stakeholders that based on the comments filed in response to the 2020 Modified IRP and feedback received during the Session III IRP Stakeholder Advisory Group, DESC intends to model an additional resource plan in its 2021 IRP Update that introduces nearer term solar and storage resources to its approved Resource Plan 8. DESC appreciates the feedback from its Stakeholders and wanted to update the group on this recent change to what was conveyed during Session III. In development of the 2021 IRP Update resource plan specifications and in response to feedback from the DESC IRP Stakeholder Advisory Group, DESC will introduce a resource plan that incorporates near term renewables which is the addition of solar and storage in 2023. The new resource plan will be RP8a and will be based on the preferred plan, RP8, but will also include the near-term renewables from RP7b, RP7b2, and RP7b3 which were the better performing plans as compared to the RP7a plans. Like the RP7b plans, RP8a will include PPA Solar and PPA battery energy storage in the amounts of 400 MW and 100 MW respectively starting in 2023. Results will be shown for three levels of solar PPA pricing, $34/MWh, $36/MWh, and $38.94/MWh, as previously specified for the Modified 2020 IRP (RP8a, RP8a2, and RP8a3). The cost of the PPA

				battery storage will be based on the "4Hr Battery Storage – Advanced" case of the NREL 2020 Annual Technology Baseline (ATB).
22	Why does DESC propose to use a single year for CO2 emissions (2049 or 2050). Aren't CO2 emissions a risk throughout the modeling period?	Eddy Moore	2021 IRP Update Inputs & Assumptions	DESC's CO2 emissions goals are associated with 2050 which is why we use this metric.
23	I would like to know what the thinking behind that (Question #22) is. If there is any expectation of CO2 regulation before 2049, there is the cost risk associated with compliance. I understand that CO2 is based on a single year of DESC's goals, but this can be vastly is different from the external regulatory environment.	Eddy Moore	2021 IRP Update Inputs & Assumptions	Once the regulation is released and we are sure what regulatory action will be taken, we will be sure to measure its impacts. We are currently focused on our company goals given the lack of clarity on specific policy requirements.
24	So, DESC is interpreting the modified order to give no direction regarding the near term solar and storage modelling?	Hamilton Davis	2021 IRP Update Inputs & Assumptions	See response to Question 21 above.
25	Looking back at the modified order, did DESC interpret this additional requirement to model near term solar and storage to have been satisfied with the RP7 alternatives?	Hamilton Davis	2021 IRP Update Inputs & Assumptions	See response to Question 21 above.
26	When fling the 2021 IRP Update, will the modeling look like RP7 or RP8?	Hamilton Davis	2021 IRP Update Inputs & Assumptions	When we looked at Order No. 2020-832, the Commission was clear and specific for the 2020 Modified IRP, but they also mentioned the 2021 IRP Update. Therefore, the we will observe the update as a refresh of the candidate resource

				plans that we were ordered to model previously. We will be updating the 2020 resource portfolios in the 2021 IRP Update.
27	Could we hear more on the ELCC topic? Why is the current annual ELCC value not appropriate for IRP purposes?	Hamilton Davis	2021 IRP Update Inputs & Assumptions	We need capacity values for all resources for summer and winter since we are building expansion plans based on peak needs for these seasons. An annual ELCC value will tend to overstate the value in winter and understates it in the summer.
28	I am interested in hearing more on ELCC from other Advisory Group Members on what other utilities have worked on.	Hamilton Davis	2021 IRP Update Inputs & Assumptions	[The following responses, #29 - #33 came from the Advisory Group Members in response to this comment.]
29	Solar ELCC is tried up with the overall resource adequacy approach. It is difficult to make progress on solar ELCC without the context of broader resource adequacy, which is what we need to discuss. Solar ELCC is a subtopic within resource adequacy and there are a number of issues in the IRP Stakeholder group that touch on resource adequacy. We should broaden the scope on this topic.	Kenneth Sercy	2021 IRP Update Inputs & Assumptions	Thank you for this comment. We hope that Stakeholders will provide feedback in the Session III homework. DESC does believe that there is an opportunity to find a better method to measuring ELCC, and we would like feedback.
30	We need to discuss things like the LOLE and ELCC methods in detail. Stakeholders should have a chance to look at how DESC is analyzing these – what are the methods, inputs, etc.? Unfortunately, this will take time, and cannot be done between now and mid-August before the next filing is due.	Kenneth Sercy		We agree that the 60-day timeline required in Order No. 2021-429 for the 2021 IRP Update will not allow us to fully explore this topic with Stakeholders but plan to continue discussing reliability in more detail as part of the future IRPs.

31	I agree that reimagining what resource adequacy looks like is important. Based on other jurisdictions, a planning reserve margin paradigm is not a good measure since it does not discern a lot about how resources (thermal and renewable) perform. Therefore, a new approach is needed. Another utility performed IRP modeling in their optimization model, then subjected portfolios to LOLE modeling. Then, they were able to get a quantitative measurement of the reliability of portfolios. Although useful, the issue is in the detail. The reliability models lack reasonable data for sampling aspects like weather. For example, many condense the representation of weather into a single value for temperature, but that does little to provide inputs on other conditions. Regarding calculating the solar capacity value, my client has made a recommendation and are happy to talk about their approach. ELCC can be done on a seasonal basis, but we need to be careful about how to do it.	Anna Sommer	2021 IRP Update Inputs & Assumptions	Thank you for your feedback.
32	I think Stakeholders need a chance to review DESC's methodology, in detail.	Kenneth Sercy	2021 IRP Update Inputs & Assumptions	Thank you for your comment.
33	I'd like to reiterate that the inertia factor doesn't make sense as a reliability factor especially with the advent of grid forming inverters.	Anna Sommer	2021 IRP Update Inputs & Assumptions	Thank you for your comment. DESC will consider the continued appropriateness of inertia as a reliability factor.

34	In response to Andrew Walker's question on reference documents on grid-forming inverters: Here's one. The title is a bit misleading - a lot of it relates to grid forming inverters. https://www.esig.energy/download/going-the-distance-moving-ac-power-from-large-inverter-based-generation-pockets-to-load-centers-nick-miller-matthew-richwine/	Anna Sommer	2021 IRP Update Inputs & Assumptions	Thank you for the suggestion. We will look into the source.
35	Can you provide us with a list of which technologies you think do provide each of these services [in reference to the reliability factors}? Some are self-obvious, but many are not.	Anna Sommer	2021 IRP Update Inputs & Assumptions	DESC will consider including this in a future session.
36	I think some of the "reliability factors" go back to resource adequacy methods, which again, we need a larger discussion on. Some of them relate to system flexibility - which we need a framework for assessing and managing, per SCBA testimony in the docket. To me, the DESC reliability factor proposal is too simple and too subjective to be useful.	Kenneth Sercy	2021 IRP Update Inputs & Assumptions	Thank you for your comment.
37	Marginal isn't the same as peak. The peak marginal factor should be used for capacity, but the average marginal factor across all hours should be used for energy.	Anna Sommer	2021 IRP Update Inputs & Assumptions	Thank you for your comment.

38	I would like to reiterate my position from the testimony in the proceeding. Average ranking is not a risk metric and has high potential to mislead when it comes to risk assessment. This continues to be my and my client's position. When I read Order 832, the way that I read the Commission's language on the topic is as it is related to the Stakeholder group. I see it as the Commission saying that the risk metrics were talked about in the proceeding, but as it was pointed out, there is a world of risk assessment that was not considered because of the modeling approach that DESC was using in this proceeding. I interpreted O. 832 as saying that the Stakeholder group should explore the additional risk assessment approaches and metrics. The order refers to considering "more refined and sophisticated risk metrics" for 2022 IRP Update because we did not get into those more sophisticated metrics in the proceeding. Then, the order is saying it would be good for the Stakeholder group to discuss and explore them. When we set this next to the other topics we talked about today, I believe that a lot of the other topics are a higher priority and are more urgent than addressing the more sophisticated risk metrics. In sum: sophisticated risk metrics are a good topic for this group and should be addressed, but I would not	Kenneth Sercy	2021 IRP Update Inputs & Assumptions	Thank you for this feedback. DESC has asked for additional feedback on risk metrics to consider in the Session II homework and will continue to accept feedback on the topic.

	put it as the most urgent thing that needs to be addressed.			
39	Comment directed to Mr. Sercy regarding comment #38: Can you explain why that is your position? Perhaps provide us with some written clarification, to look over after the meeting?	Natasha Pauling	2021 IRP Update Inputs & Assumptions	Mr. Sercy indicated he would follow up and provide more context on the topic.
40	We made a recommendation in comments that weather risk needs to be included. I think that probably relates to the longer-term discussion Kenneth is suggesting.	Anna Sommer	2021 IRP Update Inputs & Assumptions	Thank you for this clarification. We will correct the summary of Stakeholder feedback to reflect this comment.
41	Do the feedback questions for this session apply to the 2021 or the 2022 IRP Update?	Anna Sommer	2021 IRP Update Inputs & Assumptions	The timeline for implementing feedback is dependent on the topic. On Solar ELCC, there are components that DESC indicated it could address before the 2021 IRP Update. Because the retirement analysis will not impact the 2021 IRP Update, feedback can be given over a lengthier timeline. Finally, feedback related to energy efficiency integration is difficult to estimate a timeline for. Depending on what is suggested, it may be possible to incorporate feedback for the 2021 IRP Update.
42	Energy efficiency issue is one topic the Stakeholders are interested in and concerned about. The Commission's Order about using a reasonable cost of saved energy is mimicking language that they used in	Anna Sommer	2021 IRP Update Inputs & Assumptions	DESC understands your concerns with costs not being what you expect. We can discuss with ICF regarding their process for measuring LCSE.

	their concern about the approach for calculating LCSE. I understand we have limited time to create new assumptions, including for DSM for the 2021 update but there is concern about how DSM will be characterized with the update. Timing is not related to the DSM advisory group. It is also not clear how all this new analysis will influence the true plans. These are items my client has opinions on, and I would like to share their opinion. I would also like to hear DESC's reactions.			You are correct that the next potential study does not coincide with making significant changes to 2021 and the 2022 IRP Updates. We do not have plans to update the filing we made in 2019. The portfolio approved in 2019 is still being implemented. O. 832 required changes for '22, '23, and '24 and we have focused on ensuring savings levels can meet the 1% target. Now, we do not see the need to update the 2019 application since there will be a new program in 2023.
43	Do you know if savings level higher than 1% will be modeled?	Anna Sommer	2021 IRP Update Inputs & Assumptions	The savings level will remain at 1%.
44	For the components on the feedback list that could be done before the 2021 update filing, would DESC want to hear about these ASAP? The other items, are they homework for the next session? Is that how the Stakeholders should prioritize feedback?	Kenneth Sercy	2021 IRP Update Inputs & Assumptions	Generally, yes. We currently have very prescriptive sets of orders for the 2021 and 2022 IRP Updates. We feel that the timeline to address these is very compressed. Despite this, we are very definitely open to suggestions for the 2021 IRP Update.
45	I have a few initial thoughts on the bullet on page 53 – we should dedicate a session to the reliability metrics. For that session to be as valuable as possible, we need to set the table. Order 832 says that the Commission expects a traditional loss of load expectation study. Have you already done that, and can you share it with the group to help us get prepared on the topic? Then, we can have a better discussion.	Kenneth Sercy	2021 IRP Update Inputs & Assumptions	We don't have the study ready, as the Order does not say we have to complete the study. Despite this, DESC will do their best to provide preparatory materials to facilitate a productive meeting.

46	It would be helpful to have an LOLE study from DESC where we can see what the inputs, sources, specific methods and steps to taking the study. Also, the solar ELCC study and any others.	Kenneth Sercy	2021 IRP Update Inputs & Assumptions	DESC will do their best to provide preparatory materials to facilitate a productive meeting.